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ABSTRACT

A study analyzed three episodes of self-repetition in a 1-year-old's utterances and examined the child's use of self-repetition for exploiting and elaborating on his phonological system in the context of discourse. The subject was a first-born monolingual child in the Stanford Child Phonology project. The analysis provides clues about how the young child's phonological system is organized, and particularly how he handles the problem of massive formal variation in a systemic context, behaving as a phonological strategist and system-builder. It is argued that the child's phonological behavior in discourse reflects an ability to flexibly and resourcefully exploit available phonological options in the service of short-term and long-term functional objectives, both immediate communication needs and the construction and progressive elaboration of a phonological system for the articulation of words. (MSE)

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AT THE CROSSROADS OF PHONOLOGY AND DISCOURSE: STRUCTURE AND FUNCTION IN A ONE-YEAR-OLD'S CONDUITES D'APPROCHE.

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It is a commonplace observation that very young children tend to spend a lot of time repeating the same word over and over, often with substantial variation in form. From the work of Keenan (1977), Greenfield (1979), Scollon (1976) and others, we've gained an appreciation of the important pragmatic and proto-syntactic functions served by such self-repetition sequences. Scollon has also commented on their potential phonological significance, but this aspect of the phenomenon has received considerably less systematic attention.

In the present paper, I will show that careful study of phonological structure across discourse sequences can in fact provide important clues about how the young child's phonological system is organized, and particularly about how to handle the problem of massive formal variation in a systemic context. Even more importantly, from the perspective of the current shift toward cognitivism in child phonology, such analysis provides concrete and otherwise unobtainable evidence for the thesis that the young child behaves as an active phonological strategist and system-builder. I will argue that the child's phonological behavior in discourse reflects an ability to flexibly and resourcefully exploit available phonological options, in the service of both short-term and long-term functional objectives. These include not only the servicing of immediate communicative needs, but also the construction and progressive elaboration of a phonological system - conceived in the first instance as a set of structured output routines for the articulation of words.

By way of demonstration, I'll present analyses of three self-repetition episodes, uttered by a single child in the course of a single observation session. The child, named "Timmy", is one of the ten first-born monolingual children observed longitudinally by the Stanford Child Phonology Project. At the time of the audio- and videotape recordings on which the present analysis is based, Timmy was sixteen months old, and had an active vocabulary of somewhat more than thirty words.

In what follows, I will briefly introduce the model of early child phonology and the style of phonological description used in this study, with specific examples drawn from my analysis of Timmy's overall corpus of word-tokens for the present session. (A fuller discussion, based, like the present study, on an exhaustive analysis of all word-tokens uttered during the session, occurs in Queller, in prep.) Having thus sketched out the essential structure of Timmy's system, I will then offer analyses of three of his self-repetition sequences, showing how he both exploits and elaborates upon his phonological system in the context of discourse.

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From the work of Waterson (1971), Vihman (1976), Macken (1979), Menn (1978, 1983), Ferguson & Farwell (1975) and others, we now know that such phonological patterning as exists in one-year-old speech is to be found primarily at the whole-word level. The sort of whole-word patterning characteristic of children at this early age can often best be described in terms of syntagmatically structured output classes, which the child uses to organize her small but growing lexicon for easy storage and retrieval.

The most cogent general formulation of how the structure of these early, output-oriented systems can be conceived is to be found in Menn's (1983) "motor programming" framework. Each time a young child pronounces a word, according to Menn (1976), she is in effect selecting and implementing one from among a set of articulatory "word recipes". This term simply refers to the child's inventory of established motoric routines for saying words. Structurally, a child's recipe for any given word may be relatively unrelated to the rest of the recipes in her inventory, in which case it may be thought of as a "phonological idiom" (Moskowitz, 1970). More frequently, a given child's word recipes are related to each other in terms of a set of recurring ingredients, which Menn (1978) has called "articulatory subroutines".

Timmy is a child whose whole-word phonology happens to show very little "idiomaticity", in the above sense; virtually the entire set of his word recipes can be defined, at base, in terms of a small and tightly interconnected set of articulatory subroutines. Each of his basic subroutines, moreover, can be understood as a very simply patterned sequence of "melodic" variations (or more often, of non-variation) on a single articulatory parameter, such as "nasal vs. oral resonance", or "labial vs. non-labial place of articulation". These "melodies" spread in an orderly way over the domain of the entire word, regardless of the word's length.

There are two methods of phonological description which permit systematic treatment of word-level "melodies", in this sense. One, associated with the Firthean school of "prosodic" phonology, is represented in the developmental arena primarily by the work of Waterson (1971). The other is the version of generative phonology which allows for "autosegmentalized" lexical representations, in which phonological features are specified on their own articulatory "tiers", at levels distinct from that of the segmental core (Goldsmith, 1979; van der Hulst & Smith, 1982). In the present discussion, I will use a style of notation now widely familiar from the extensive work currently being done in the latter vein. This is essentially a matter of expository convenience; it is not my purpose here to argue for the necessity of an autosegmental treatment, or for the greater "psychological reality" of this, as against other forms of representation.*

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* The conceptual framework used here is actually closer in some respects to that of Firthean prosodic phonology than to that of autosegmental generative phonology. This is because I am concerned

Each independent articulatory parameter may thus be represented as a distinct autosegmental "tier", and each of the child's subroutines is represented as a "melody" (either monotonic or complex) upon its respective tier. Figure 1 shows the set of articulatory subroutines which together define the basic parameters of Timmy's whole-word phonology. There are three types of core syllable structure, represented here as three CV-skeletons, respectively mono-, di- and trisyllabic, with open syllables and with in each case an optional prothetic vowel and/or other laryngeal element, which does not directly affect the word's meaning or structural syllabicity. There are three mutually independent consonantal tiers, with a total of seven melodies. (Note that "Palatal" here refers to articulations

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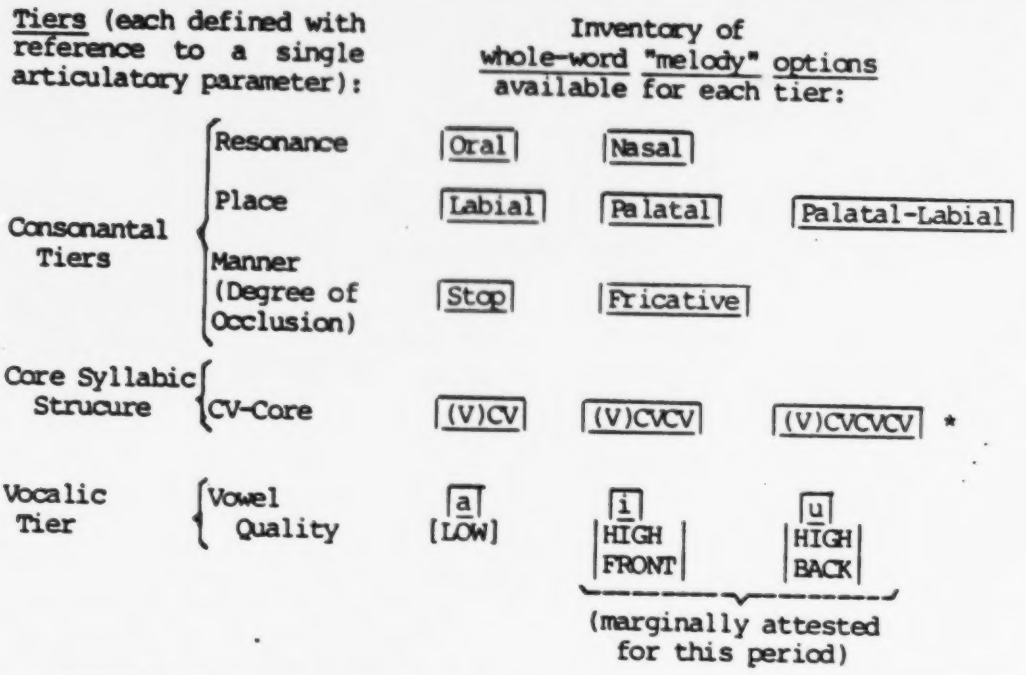
primarily with generalizations over an inventory of essentially static lexical representations, rather than with the kinds of item-and-process generalizations which are the primary focus of generative phonological descriptions. ("Subterfuge modifications" [infra] are the closest thing here to item-and-process, and even these are quite different in nature from ordinary generative "rules".) The main reasons for using an autosegmental style of representation here are (a) to characterize as simply as possible the inventory of motoric gestures (articulatory subroutines) constitutive of the child's basic set of output schemas for words, (b) to show how certain otherwise apparently anomalous forms are, in fact, better understood as systematically deformed versions of ordinary schemas, and (c) to elucidate the possible role of such deformations in the gradual expansion and differentiation of the system as a whole. I will not be concerned here with controversies over such things as the criteria for treating a feature as "autosegmentalized", or the nature and role of conventions for associations among tiers. (For some discussion, see Queller, in prep.)

I should, however, point out one crucial respect in which the present approach diverges from both Firthean and generativist assumptions. The representations of articulatory word recipes proposed here are not claimed to directly reflect the child's "underlying", perceptually-based representations of words, either on a basis of equivalence (with output form more or less directly reflecting input representation, à la Waterson) or through the mediation of a set of consistently applied realization rules (à la Stampe, Ingram or Smith). Instead, I assume that word recipes are independently specified in the lexicon, one or more for each item in the child's active vocabulary. The type of phonological patterning which concerns me here accordingly involves relations within this set of output lexical representations or word recipes, rather than between output form and other levels of representation. (For justification of such a "split lexicon" approach in early child phonology, see Vihman (1982), Menn (1983) and Queller (in prep.); see the latter also for a more explicit and exhaustive analysis of the data set upon which the present study draws, as well as for my specific views on the relations between input representations and output forms.)

Fig. 1. The core of Timmy's whole-word phonology: an inventory of articulatory subroutines, construed here as autosegmental "melodies".



* (V)... = optional prothetic vowel (or other laryngeal element) [actually an abbreviation for (({ })(V))...].

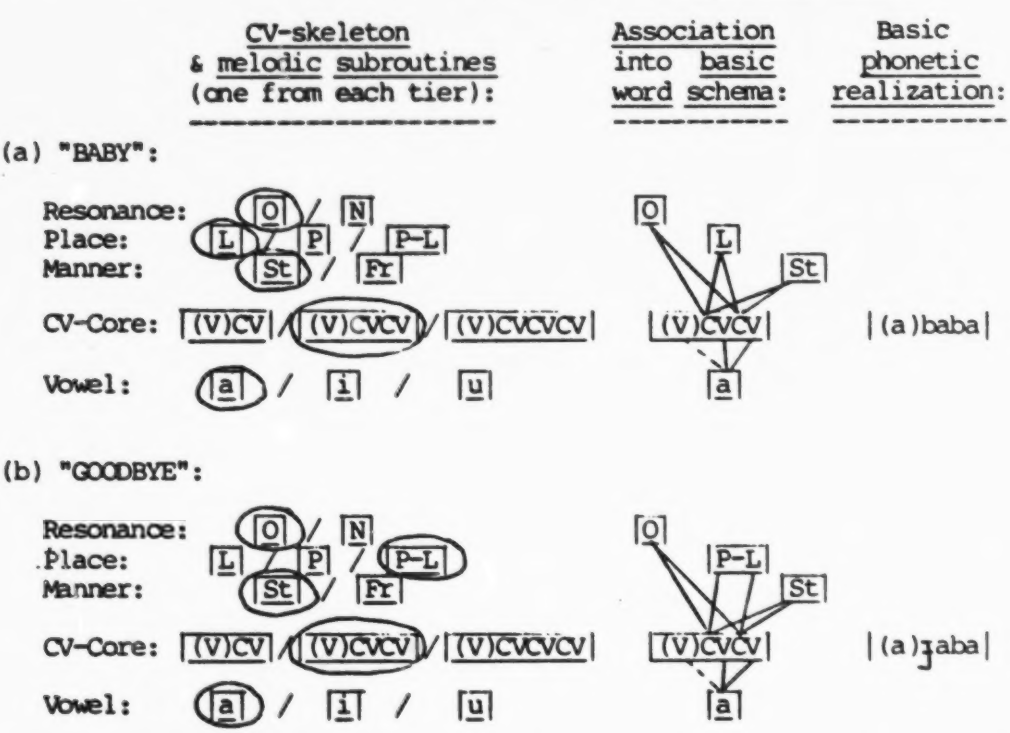
ranging from alveolar to velar; most often, they are realized as palatal, in the strict sense.) There is a single vocalic tier, with only one basic melody, consisting of the low vowel /a/; the melodies /i/ and /u/, at this point, are attested but extremely marginal.

For some of the words in his active lexicon, Timmy has for the time being settled upon a specific word recipe, which he uses consistently whenever he says that particular word. Figure 2 takes his words BABY and GOODBYE as an example. The word BABY occurs frequently throughout the session, always in a form something like [(a)baba]. The corresponding word recipe involves a single choice from among what I will call Timmy's set of "basic word schemas". These constitute the fundamental performance units within his overall system of word recipes. Structurally, a word schema can be described as a pattern which selects a single melodic routine from each tier, associating each melody simultaneously with a single CV skeleton. This is shown for "BABY" in Figure 2a. (The same basic schema also underlies all tokens of BRACELET, and some versions of PEG and FLOWERS.)

The schema which constitutes Timmy's recipe for saying "GOODBYE"

is almost the same, but instead of a monotonic Labial melody on the place tier, it uses the complex Palatal-Labial melody. The two components 'Palatal' and 'Labial' map onto the two onset consonants in a one-to-one fashion, and necessarily in that order. This is shown in **Figure 2b.** The usual phonetic realization of this schema is [(a)ʒaba] (- a form which is used consistently for GOODBYE, and sometimes also for TAPERECORDER and FLOWERS).

Fig. 2: Timmy's word recipes for "BABY" and "GOODBYE":
- consistent selection of one simple basic word schema.



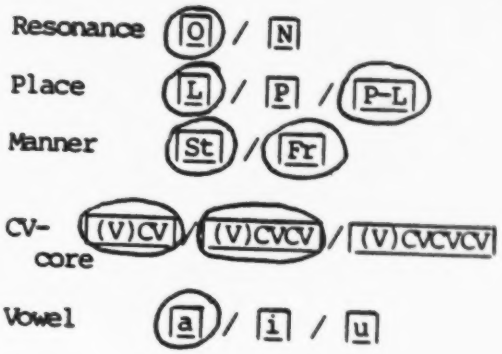
Two further basic word schemas, |(a)mama| and |(a)ɲama|, are realized when the Nasal rather than the Oral melody is selected for the resonance tier, while retaining everything else as in Figure 2(a&b). (These are the schemas for Timmy's words MOMMY and SIMON, respectively.) In contrast, note that the schemas *|(a)baʒa| and *|(a)maɲa| are "ungrammatical" for Timmy at this stage. Within the present descriptive framework, this fact corresponds to the non-existence of any *[Labial-Palatal] melody on the Place tier. Timmy currently has only one articulatory subroutine for dealing with Palatal and Labial consonants within a single word, and it requires that they be articulated in that order, whatever the other structural characteristics of the word may be. (See Vihman, 1976, Macken, 1979 and Menn, 1978 for discussion of similar phenomena.)

Timmy's word FLOWERS is more complicated, but the same principles are involved. Figure 3 illustrates the schematic structure of this word. Evidently, he has not settled on a single, consistent word recipe for FLOWERS; his forms for the word vary over no fewer than four of his basic word schema options. These four options are defined by systemic alternations at several levels within the inventory of basic subroutines. Figure 3a shows that, in the overall recipe for FLOWERS, there is a two-way alternation at each of three levels: the

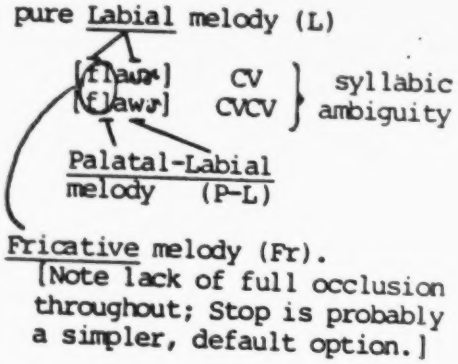
Fig. 3. FLOWERS: Structurally, a case of schema conflict.

|(a)ʒaba| ~ |(a)zaβa| ~ |(a)baba| ~ |(a)ɸ a|

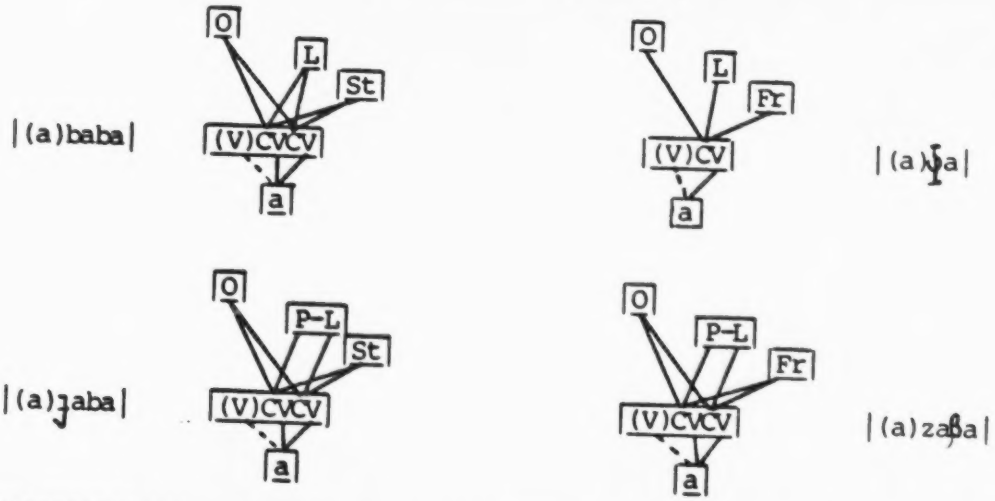
(a) Melodic subroutine alternations.



(c) Relationship of alternating melodies to gestalt features of target word.



(b) Internal structure of the four basic word schemas underlying Timmy's versions of FLOWERS.



CV-core, the place tier, and the manner tier. This yields eight theoretically possible schematic variants for FLOWERS; the structures of the four which actually occur are shown in Figure 3b.

If we compare some of the alternating melodies with selected features of the target word FLOWER(S), as in Figure 3c, we find that Timmy's choice of melodic alternants is far from random. Each schematic option captures a slightly different subset of a larger set of features, which we may presume to be somehow characterized within Timmy's input phonological representation of the word.

What we have here is a clear case of the well-known phenomenon which Garnica and Edwards (1977) have called phonological "trade-off". Ferguson (1985) has observed that this phenomenon ordinarily reflects "schema conflict" within the child's phonological system. That is, the child has available several whole word schemas, each of which can accommodate certain parts of a larger set of target features, but no single form can express them all at once.

This formulation in terms of conflicting phonological output schemas very aptly characterizes the nature of the structural constraints which underlie formal variation of the type we see in the FLOWERS example. What I want to argue here is simply that the child's relationship to these constraints must be viewed as that of an active phonological strategist. Not only does he react to structural constraints; he also creatively exploits his available systemic options. Good evidence for this claim is to be found in discourse.

The case of Timmy's word FLOWERS is particularly nice, because all four schematic options are found in the course of a very brief discourse episode, transcribed in Figure 4a. The episode is basically an instance of what Scollon calls "discursive repetition". This is the familiar pattern in which the child repeats a word over and over, trying in a variety of ways to get the listener to "cue in" to and acknowledge the intended referent. The means which Timmy employs to that end in the present case, I would claim, can be characterized in an active sense as a strategy of "phonological schema <u>shifting</u>". Let's see specifically how this works in the FLOWERS episode.

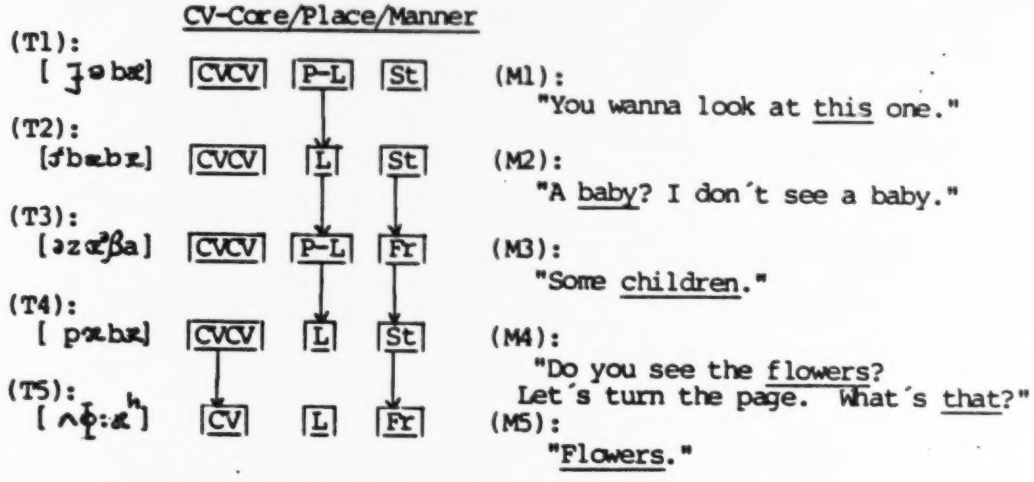
Notice, in Figure 4a that each time mother makes a guess, Timmy switches one or two of the three basic structural parameters which are susceptible to variation within his overall articulatory "recipe" for FLOWERS. The value of each of Timmy's word tokens on each of these parameters is noted in the transcript, so that one can trace the internal structure of his schema shifting, from one token to the next. Except for the token at (T4), which represents a reversion to the schematic structure used at (T2), each repetition gives a different schematic rendition of the same word, each time providing the listener with a slightly different combination of clues to the overall structure of the target word. The phonological shifts help to carry part of the general pragmatic "meta-message" which is characteristic of discourse-motivated repetition, and which can be paraphrased roughly as follows: "I'm not sure you're cueing in to what I'm saying yet. Listen again."

Additional evidence for the strategic character of this episode of schema shifting can be found in the methodical, even elegant manner

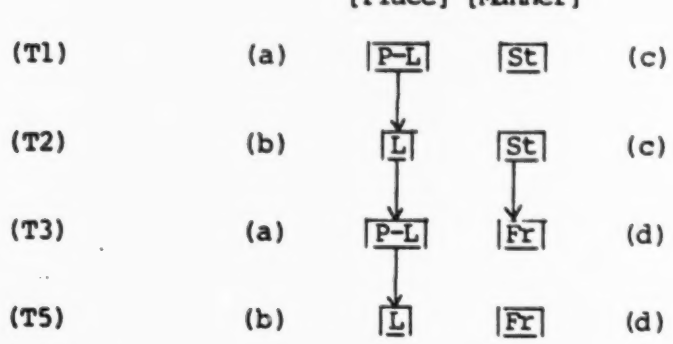
in which the sequence of shifts proceeds. Let us subtract the schematic repetition at (T4) from the sequence, as shown in **Figure 4b**, and consider only the four schematically distinct tokens. Focusing in now on the sequence of melody-switching on the two consonantal tiers, where the bulk of the variation occurs, we can see that Timmy's side of the episode is formally characterized by an almost poetic kind of overall sequential patterning. Such methodical structuring of the overall discourse sequence provides additional evidence that the child is not simply letting his tongue slip from pattern to pattern, but is instead actively manipulating his available phonological options.

Fig. 4. The FLOWERS episode: functionally, a case of schema shifting.

(a) The episode, with Timmy's variants of FLOWERS characterized for three basic word schema parameters showing alternations for this word.



(b) Patterning in the sequence of melody-switching on the two consonantal tiers (with the schematic repetition at (T4) subtracted).

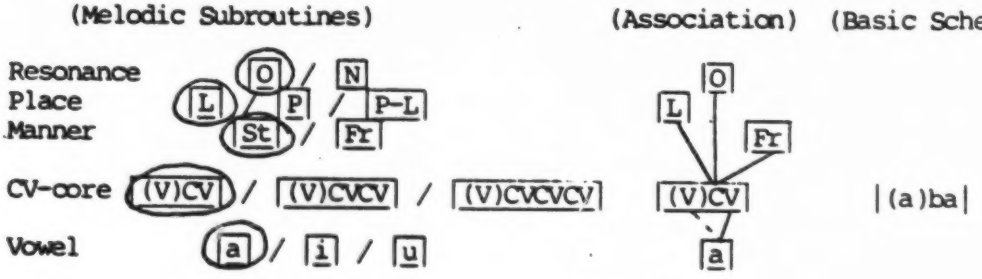


"Schema shift" is not the only phonological strategy which Timmy can be found exploiting in discourse. A second kind of strategy, which I call "subterfuge modification", is represented for example by his four partially distinct forms for the word BALLOONS:

(a) [(a)ba:--] (b) [(a)bai] (c) [(a)bai:--] (d) [(a)baji]

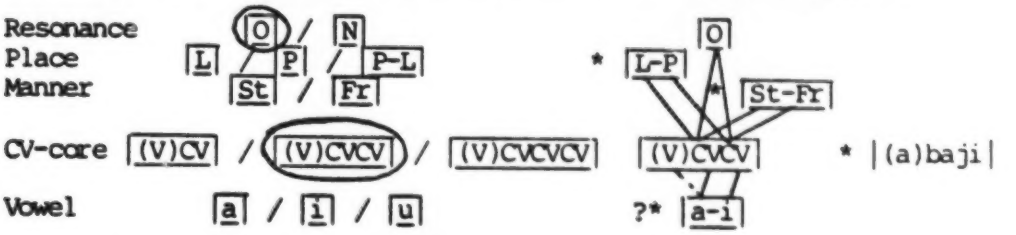
These, I will argue, are all versions of a single basic schema, represented in Figure 5. That we are not dealing here with a series

Fig. 5. Timmy's basic recipe for BALLOONS: a single basic word schema which underlies all of his variant forms for the word.



of shifts across distinct schematic categories can be demonstrated most clearly with reference to form (d): [baji]. (See Figure 6.)

Fig. 6. Problems in trying to analyze [baji] ("BALLOONS") as a direct product of Timmy's system of basic word schema options:



Phonetically, [baji] is disyllabic, with a medial voiced palatal fricative. Any attempt to analyze it as such within Timmy's system of basic word schemas, however, yields a structure which is quite irregular, containing three complex melodies which we had not posited as belonging to the inventory of basic subroutines. The vocalic tier shows an offgliding Low-High sequence [a-i]; there is some motivation for accepting this as an emerging unit within Timmy's inventory of basic melodies, as we'll see later. The complex melodic patterns

"Labial-Palatal" and "Stop-Fricative", however, have no independent structural support anywhere else in Timmy's whole-word phonology.

Structurally, the variant forms for BALLOONS are better accounted for with reference to a closely-knit set of simple modificatory processes, for which there is substantial independent support elsewhere in Timmy's whole-word phonology. These modificatory processes can be represented as a series of deformations which occur specifically at the level of the CV-core, within a given schema. In effect, they constitute an additional set of articulatory subroutines, operating at a secondary level within the overall system, distinct from (and superimposed upon) that of the basic melodic subroutines. In terms of the "word recipes" metaphor, one might think of them as sauces and seasonings: they're frequently optional, and occasionally obligatory, yet they never constitute a "dish" by themselves.

In order to get a sense of how these modificatory routines work, we need to play around for a moment with another set of metaphors: those in terms of which we habitually think of segmental structure in phonology. The kinds of images which underlie our conception of the sequence of segments (or CV slots) in a word are, I suggest, of the following sort: the fixed number of discrete and more or less uniform pearls in a necklace, of links in a chain, or of candies in a roll of Lifesavers. For present purposes, at least, I would propose that they be visualized instead as points along a stretch of some more elastic substance, such as a roll of clay or silly-putty. What makes a roll of clay different from a roll of Lifesavers is that it can be stretched or pinched at any number of points along its length, so that certain of its sections become longer and/or narrower than others.

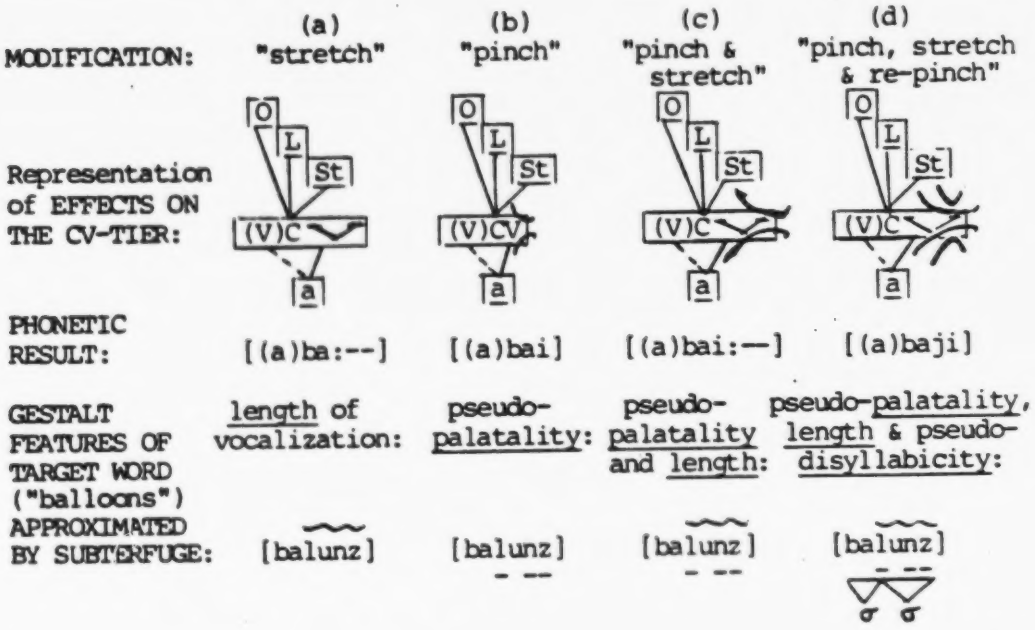
I would claim that some roughly analogous set of articulatory devices underlies quite a number of Timmy's words tokens. Figure 7 shows specifically how articulatory stretching and pinching work to produce his variant forms of BALLOONS.

We begin, in each case, with the same basic word schema: |(a)ba|. The featural melodies on the various tiers remain unchanged throughout. The changes all take place at the level of the CV-core; in the present case, they all focus on the the tail end of the vocalic element. In form (a) [ba:—], This element is simply stretched, without any further deformation, and the phonetic result is that of a prolonged vowel. In form (b) [bai], the same part of the CV string is pinched in such a way that the vocal tract is narrowed at that point, producing the phonetic effect of a palatal offglide. We represent this iconically with a pair of curved lines "pinching" the CV skeleton (or roll of clay) at the appropriate point.

Form (c) [bai:--] shows one way in which stretching and pinching can be combined, with the phonetic effect of a prolonged palatal offglide. Finally, when a form like that in (c) gets re-pinched at a point before the end of its palatal offglide portion, we get (d) [baji], with the phonetic effect of an intrusive palatal glide or fricative yielding to a high front vowel.

None of these child forms provides an astoundingly good match to the target word "balloon", but all of them are better than [ba]. In fact, scanning across the bottom of Figure 7 from left to right, one

Fig. 7. Timmy's four versions of BALLOONS as subterfuge modifications within a single basic word schema.



can see that the more the form is modified away from the idealized schematic version |(a)ba|, the greater the number of gestalt target-word features it incorporates. Form (a), with simple lengthening, mimics at least something of the overall length of "balloon", while the palatal offglide in (b) reflects the fact that the prominent second syllable of "balloon(s)" includes in its consonantal elements a lot of what Timmy usually expresses as palatality. Form (c) combines these global features of length and palatality in one word-form. The same is true of (d) which, in addition, even manages to reflect something of the disyllabicity of "balloon(s)".

These structural observations strongly suggest that strategic motives may be involved when the child moves from less modified forms (as in (a) and (b)) to more modified forms (as in (c) and (d)). The goal of such a move, just as in schema shifting, would be to accommodate as many target-word features as possible, while working within the set of options and constraints imposed by the output system. In the present case, the child does this not by shifting across word schemas, but by engaging in a kind of strategic phonetic subterfuge within a chosen schema. It is on the basis of considerations like these that I subsume structurally defined modificatory processes such as "stretching" and "pinching" under the more general, functionally oriented rubric of "subterfuge routines".

Before accepting modification of schemas by subterfuge routines

as a new kind of phonological strategy, however, we would like to see some evidence that the child actually does deploy them strategically. Again, the best way to find such evidence is to look at the distribution of forms in discourse.

Figure 8 shows the beginning of a somewhat longer self-repetition episode involving BALLOONS. Like the FLOWERS episode, the present discourse refers to illustrations in a picture book. In this case, however, there is no serious doubt about the reference of Timmy's remarks. What is of primary interest, for present purposes, is his response to the two attempts by his interlocutors to shift the topic of conversation away from that of "balloons", which he has himself established at (T1). The attempted topic shifts are marked by the arrows in the transcript.

Fig. 8. The BALLOONS episode: subterfuge modifications in the service of discourse objectives.

(T1) [bʌ·i] BALLOONS [pinch]. (pointing to balloons.)	(M1) "Balloons. -▶ -Is this a boy? Can you say 'boy'? Boy." (pointing to boy on same page.)
(T2) [bʌi] ?BALLOONS / 'BOY'? (pointing where mother has just pointed.)	(M2) "Yes." (whispered; turns page.)
(T3) [?bai:—] BALLOONS [pinch & stretch]. (pointing to balloons on new page.)	(M3) "Balloons." (O6) "He's got a lot of balloons. -▶ Does he have a teddy?" (pointing.)
(T4) [?bɐ̯ji] BALLOONS [pinch, stretch & re-pinch]. (pointing to same place as at T3.)	(M4) "Balloons." (turns page.) ...

At (M1), we see mother acknowledging Timmy's initial utterance by repeating: "Balloons". But then, noticing the similarity between Timmy's simple pinched version of BALLOONS and the sound of the adult word "boy", she immediately points to the boy in the picture and says "Is this a boy?", trying to get him to say that word.

At (T2), Timmy makes at least a passing gesture of acquiescence; he points where she has just pointed, and again says [bʌi]. It remains rather unclear whether this token counts for him as an imitation of "boy" or as a repetition of BALLOONS. There is no evidence anywhere else in the data of "boy" being an item in Timmy's active vocabulary.

What <u>is</u> clear is that a bit of phonetic / semantic confusion has been introduced. Timmy's forms for BALLOONS at (T3) and (T4) serve to

counteract this potential confusion, as well to parry a second attempt at topic shift. Structurally, he has switched from his relatively less modified previous form to more strongly modified and less ambiguous forms. [Compare form (b) vs. forms (c) & (d) in Figure 7.]

Here, then, is another strategic use of phonological options in the service of a pragmatic objective. Whatever other, purely phonological functions such subterfuge variation may have, here we see that it, like schema shifting, may also be used to convey the meta-message which is typical of what Scollon calls "discursive" repetition - essentially: "This is what I'm talking about; don't you see?"

The distinction which Scollon (1976) made between "discursive" and "phonological" functions of self-repetition in one-year-old speech is not a strictly dichotomous one; many episodes, he claims, simultaneously serve both kinds of function. The schema-shifting pattern of Timmy's FLOWER sequence provides a rather clear example. While giving the listener clues to the child's communicative intent, the shifts in form across such sequences probably also reflect the child's search for a suitable recipe for the word, in terms of which he might regularize and systematize his pronunciation of it, for more efficient storage and retrieval.

The following episode is slightly different; it is an example of purely phonological repetition. I propose that careful analysis of episodes of this sort can yield evidence for a rather strong and interesting claim: that the child's experimentation within his set of systemic options may actually serve to open up new, previously unavailable systemic options, thus allowing the child to elaborate and expand his phonological output system "from within". Scollon (p. 100) suggested that this was the essential function of phonological repetition; however, in a study primarily devoted to the discourse foundations of early syntax, undertaken at a time when there existed no descriptive framework really adequate to the task of analyzing one-year-old phonology, he was unable to provide detailed support for the claim. In a recent review of the arguments for a cognitivist approach to phonological development, Macken and Ferguson (1984) reaffirm the need to find data on the role of active experimentation on words in the building of children's phonological systems; however, they lament the relative scarcity of such data in material examined to date.

Again, part of the problem is that we, as phonologists, often pay too little attention to what happens across sequences of utterances in discourse. In the following, I'll attempt to show how systematic variation of a word's form across stretches of self-directed discourse may indeed help the child to expand his output system from within. Specifically, I claim that subterfuge modification of basic word schemas, constructed according to a narrowly delimited inventory of articulatory subroutines, provides the child with a basis for extending the inventory itself. This may be done in such a way that the child adds new elements (viz., new basic melodic subroutines) to the inventory, but without ever going outside the constraints of the inventory in its original, more restricted form.

The episode in question involves a word of extremely high token

frequency for the present session: Timmy's word for LIGHT. Often throughout the session, Timmy looks fondly over at the lit-up recording equipment and utters variations on the forms |(a)ɟa| and |(a)ja|, which his mother glosses quite consistently as LIGHT. In the present scene, he actually toddles over to the tape-recorder, where he sits down with his back to both mother and observer. While carefully re-adjusting the recording equipment, he utters the self-directed discourse transcribed in Figure 9.

Forms (T2) - (T9) are all variations on his word for LIGHT. The "recipe" for all of them contains the same basic schema, except that there is a shift from Stop to Fricative on the manner tier. This can be seen by comparing the first and last tokens of LIGHT ((T2) & (T9)). Looking at the intervening sequence of repetitions, however, we can see quite clearly that the present schema shift is mediated by a whole series of forms, all of which reflect various patterns of subterfuge modification to the input schema seen initially at (T2).

The details of how this happens are included for reference in the transcription, but the the gist of the matter is summarized in Figure 10. Essentially, what he's doing is stretching and pinching the initial prothesis element, in such a way that the main syllable onset consonant is also affected. (See the middle part of the Figure.) As the consonantal portion gets pulled into the prolonged, mushy palatal transition which now intervenes between the onset of phonation and the primary vowel at the end, its melodic specifications "float", and the ballistic articulatory effects of the stretching and pinching take over. At (T3) and from (T5) onward, the pinched prothesis rebounds toward the main syllable vowel with something like an intrusive palatal glide or fricative; in most of the forms, moreover, this "rebound" element effectively replaces the previous, fully occlusive onset consonant. As the stretching is gradually reduced, the consonantal portion re-emerges from the palatal mush - but now with a Fricative rather than a Stop value on the manner tier. (See the right-hand part of Figure 10.)

In short, subterfuge in this case constitutes the means by which Timmy manages to break out of one basic schema and into another. Now, if all of Timmy's word tokens containing Fricative melodies could be shown in this way to be products of subterfuge modifications within other, more basic schemas, we could entirely eliminate the manner tier Stop / Fricative contrast from the set of parameters to be specified in basic word schemas, thus achieving a much simpler basic inventory of subroutines. (This would be equivalent to the set represented in Figure 1, except that the manner tier would be entirely eliminated.) In fact, though, a sizable proportion of his Fricative tokens show no alternant forms with Stop articulation, and no evidence of having been methodically "built up to", over a series of repetitions. The discourse evidence as a whole thus suggests that Timmy has access to Fricative articulations by both routes, often directly selecting a schema that comes specified with a Fricative melody, but sometimes taking the long way around, via subterfuge modification.

Multiple ways of accessing the same material may seem needlessly redundant in terms of descriptive economy, but from the point of view

Fig. 9. The LIGHT episode: Repetition in the service of purely phonological considerations.

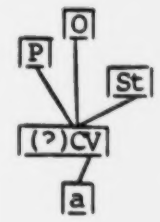
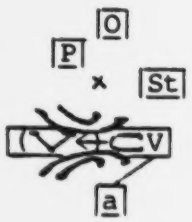
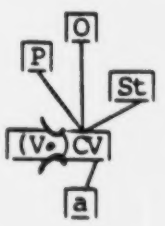
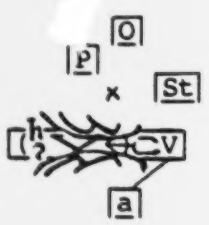
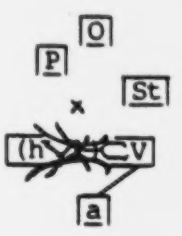
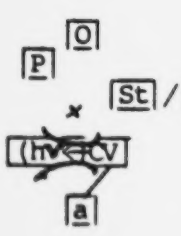
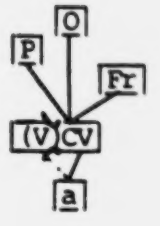
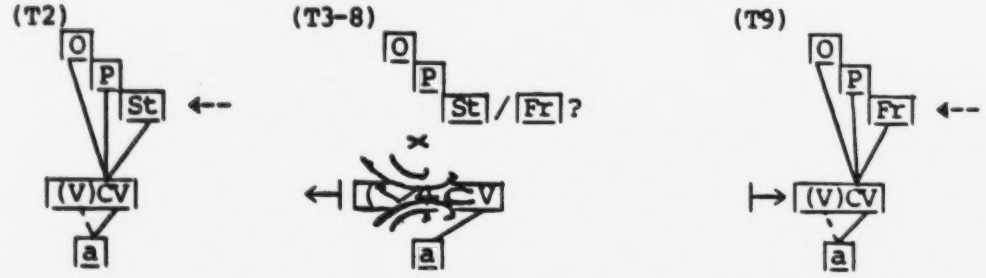
Phonetic form:	Word schema (w/ subterfuge modifications indicated as deformations of CV-Tier):	Gloss:
(T1) [agaʔga]		[Protoword form, sometimes used for "TAPERECORDER"]
(T2) [ʔgɑːʰ]		"LIGHT"
(T3) [aⁱɕʲiʲjæ]		"LIGHT"
(T4) [aᶻʒjæ]		"LIGHT"
(T5) [heɣˠɣˠja] (T6) [ʔɪʒɾʒɪja]		"LIGHT"
(T7) [hɾʒːjæ]		"LIGHT"
(T8) [hija]		"LIGHT"
(T9) [aijæ]		"LIGHT"
(T10) [akŋgŋ]		[Preferred babble form]

Fig. 10. Simplified representation of how subterfuge modifications (Stretching & Pinching) are used to effect schema shift ([St] -> [Fr]) in the LIGHT episode.



Entry as basic Monosyll. / Oral / Palatal / Stop schema

- |(a)ɟa|

"LIGHT"

SUBTERFUGE within this schema. (Stretching and pinching of prothesis, with coinvolvement of the main syllable onset consonsant; autosegmental melodies are "floated", as the ballistic effects of subterfuge take over.)

Re-emergence as new basic schema (Monosyll. / Oral / Palatal / Fricative).

- |(a)ja|

"LIGHT"

of on-line linguistic processing, such redundancy is indispensable. Peters (1983), in her monograph on the units of language acquisition, reviews various kinds of evidence for the claim that acquisition of syntactic fluency requires a capacity for "fusing" what are originally complex production routines into single, immediately accessible performance units. The schema-shifting-via-subterfuge-modification pattern seen in episodes such as the LIGHT sequence may very well represent part of an analogous phonological process, whereby laboriously derived word forms gradually get fused into structural entities which are accessible as basic performance units. Under certain circumstances, new units of this sort would become susceptible to structural reanalysis in terms of the child's system of articulatory subroutines - in some cases, as new basic melodies.

Translating this on-line processing perspective into an explicitly longitudinal, developmental one, this amounts to a claim that something like what we've represented as an autosegmentalized manner tier, with its Fricative melodic option, is actually in the process of emerging within the system, as Timmy gradually reinterprets the phonetic output of his subterfuge routines in terms of his basic schema inventory. This developmentally emergent character of the manner tier could be represented by the use of parentheses in our list of the elements constituting the basic inventory, as in Figure 11.

A similar scenario is probable in the case of the offgliding [a-i] vowel sequence resulting from pinching. Figure 12 shows how forms

Fig. 11. Extended inventory of basic melodic subroutines.

Tiers:		Melodies:
Consonantal Tiers:	Resonance:	[ORAL] / [NASAL]
	Place:	[LABIAL] / [PALATAL] / [PALATAL-LABIAL]
	(Manner:	[STOP] / [FRICATIVE]) *
Core syllable structure:	CV-core:	[(V)CV] / [(V)CVCV] / [(V)CVCVCV]
Vocalic Tier:	Vowel quality:	[a] / [i] / [u] / ([a - i]) *

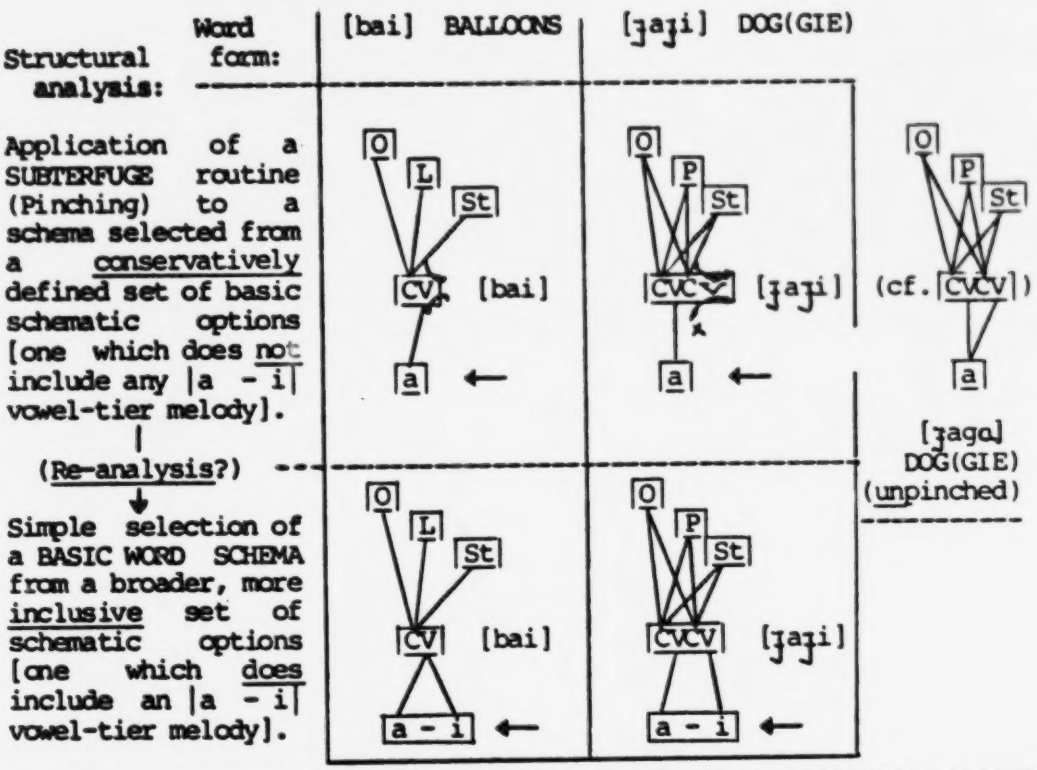
* Parentheses ( ) enclose Tiers and Melodies assumed to be currently emergent within the inventory of basic schema options, via re-interpretation of forms originally derived by application of modificatory SUBTERFUGE routines.

such as [bai] for BALLOONS and [ʒaɪi] for DOG(GIE) are structurally ambiguous between a pinching interpretation and an alternative interpretation involving a basic [a-i] melody on the vowel tier. The former interpretation assumes only the restricted set of melodies used thus far. The latter interpretation implies a structural reanalysis of pinched forms with palatal offgliding vowel sequences in terms of an extended set of basic melodic subroutines, such as in Figure 11.

Further longitudinal analysis is needed, of course, in order to determine to what extent experimentation in discourse actually does serve as a means by which children elaborate their phonological output systems from within. However, I would maintain that even longitudinal data cannot be fully exploited without careful attention to the child's phonological behavior in discourse. For example, we may well find [a-i] vowel sequences attested for Timmy at times both prior and subsequent to the present session, but with fundamental differences in structural status. Just as in the case of syntactic construction, examination of structure across sequences of utterances in discourse may provide the crucial evidence regarding how construction has occurred, in each case.

Figure 13 provides a summary of how the various structural and functional parameters discussed above interact across the three episodes. Both the FLOWERS and the BALLOONS sequence contained indications that the repetition was in some considerable part motivated by familiar discourse factors, involving such things as the need to resolve referential ambiguity, or to establish (or maintain) a particular discourse topic. The phonological strategy Timmy employed in the FLOWERS episode was that of shifting across his set of whole-word output schemas. In the BALLOONS episode, he resorted to a

Fig. 12. Structural ambiguity of |a - i| vowel sequences in selected tokens of 'BALLOONS' and 'DOG(GIE)' (modificatory SUBTERFUGE vs. basic SCHEMA SELECTION):



different kind of phonological strategy: a kind of "subterfuge" which allows him to modify the output form of a word, while remaining within the same basic schema. The two strategies correspond to two distinct structural levels within the output system as a whole, as indicated on the right side of Figure 13. (There is no necessary correlation, however, between the structural character of the strategy and the function which it serves in any particular instance.)

The LIGHT sequence illustrated in a rather pure way how self-repetition can be used for intrinsic phonological purposes. These purposes, I would claim, involve two related subgoals: (a) the discovery, establishment, fine-tuning and re-ajustment of articulatory word recipes for items in the active lexicon, and (b) the internal elaboration and realignment of the phonological output system itself. In the LIGHT sequence, these phonological functions were subserved by a complex combination of the two types of strategy already described, in such a way that the one (subterfuge) was itself used as a means for achieving the other (schema shift). I have suggested that the two strategies interacted here in the way they did because Timmy was

Fig. 13. Summary of the structural & functional characteristics of each of the three self-repetition episodes.

Episode:	Predominant function served by repetition:	Phonological strategy involved:	Level of the phonological output system involved:
FLOWERS	"DISCURSIVE" (& PHONOLOGICAL?)- [establishment of joint reference]	SCHEMA SHIFT (across schemas)	Primary level of BASIC WORD SCHEMAS (word recipes requiring only selection of CV-skeleton & basic melodic subroutines)
BALLOONS	"DISCURSIVE" (& PHONOLOGICAL?)- [disambiguation of reference & maintenance of discourse topic]	SUBTERFUGE MODIFICATION (within a single schema)	Secondary level of MODIFICATORY SUBROUTINES (at which complex word recipes are derived from more basic ones)
LIGHT	PHONOLOGICAL - [establishment & readjustment of word recipes for lexical items; elaboration of output system as a whole]	Both, with SUBTERFUGE MODIFICATION leading to SCHEMA SHIFT	BOTH levels at once (fusion of a secondarily derived recipe into a basic one, with re-analysis in terms of a new inventory of output schema options available at the primary level)

fusing a derived word recipe into a simpler, unitary one, which he could then reinterpret in a way that would contribute to the diversification of his inventory of basic output schema options.

Throughout this discussion, I've said next to nothing about an issue which has been central to much previous work in child phonology - that of characterizing the so-called "transduction rules" which mediate between the child's input phonological representations for words and his output forms. I have preferred instead to focus on the output system itself as an independent level. As a concluding note, I'd like to say just one thing in favor of a frank output-system bias. The issue of how transduction relationships get established in early child phonology is extremely important, but it's also more problematic than commonly assumed. Even when we find regular correspondences between adult and child forms, the evidence that the child is literally applying modificatory processes to derive an output from an auditorily-based input representation may remain quite circumstantial.

(This is partly because neither the child's input representations nor the cognitive structures or processes which relate them to the child's output forms are accessible to direct observation.) I submit that, if we want to demonstrate clearly that the child actually subjects phonological representations to some kind of real-time modification process for some strategic purpose, there is no better way than to actually observe how the child modifies one kind of output-level representation into another, across actual stretches of discourse. By doing that, we may in fact come to learn all kinds of new and interesting things about how the child goes about building and continually reorganizing that rather less directly observable kind of entity that we call a phonology.

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